A Primate lncRNA Mediates Notch Signaling during Neuronal Development by Sequestering miRNA.

Journal: Neuron

Publication Year: 2016

Authors: Neha Rani, Tomasz J Nowakowski, Hongjun Zhou, Sirie E Godshalk, Veronique Lisi, Arnold R Kriegstein, Kenneth S Kosik

PubMed link: 27263970

Funding Grants: The UCSB Laboratory for Stem Cell Biology and Engineering

Public Summary:
Long non-coding RNAs (lncRNAs) are a diverse poorly understood group of RNAS expressed at particularly high levels in the brain of primates. We identified an lncRNA, in the Catarrhini branch of primates. This lncRNA, termed LncND (neurodevelopment), is expressed in neural progenitor cells and then declines in neurons. LncND controls the expression of Notch receptors, which are important in neural development. LncND expression is enriched in radial glia cells (RGCs) in the ventricular and subventricular zones of developing human brain. These findings support a role for LncND in regulation of Notch signaling within the brain of primates that may have contributed to the expansion of cerebral cortex.

Scientific Abstract:
Long non-coding RNAs (lncRNAs) are a diverse and poorly conserved category of transcripts that have expanded greatly in primates, particularly in the brain. We identified an lncRNA, which has acquired 16 microRNA response elements for miR-143-3p in the Catarrhini branch of primates. This lncRNA, termed LncND (neurodevelopment), is expressed in neural progenitor cells and then declines in neurons. Binding and release of miR-143-3p by LncND control the expression of Notch receptors. LncND expression is enriched in radial glia cells (RGCs) in the ventricular and subventricular zones of developing human brain. Downregulation in neuroblastoma cells reduced cell proliferation and induced neuronal differentiation, an effect phenocopied by miR-143-3p overexpression. Gain of function of LncND in developing mouse cortex led to an expansion of PAX6+ RGCs. These findings support a role for LncND in miRNA-mediated regulation of Notch signaling within the neural progenitor pool in primates that may have contributed to the expansion of cerebral cortex.

Source URL: http://www.cirm.ca.gov/about-cirm/publications/primate-lncrna-mediates-notch-signaling-during-neuronal-development